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The Relative Value of High-Grade and Low-Grade Calves

Marketed as Two-year-old Steers

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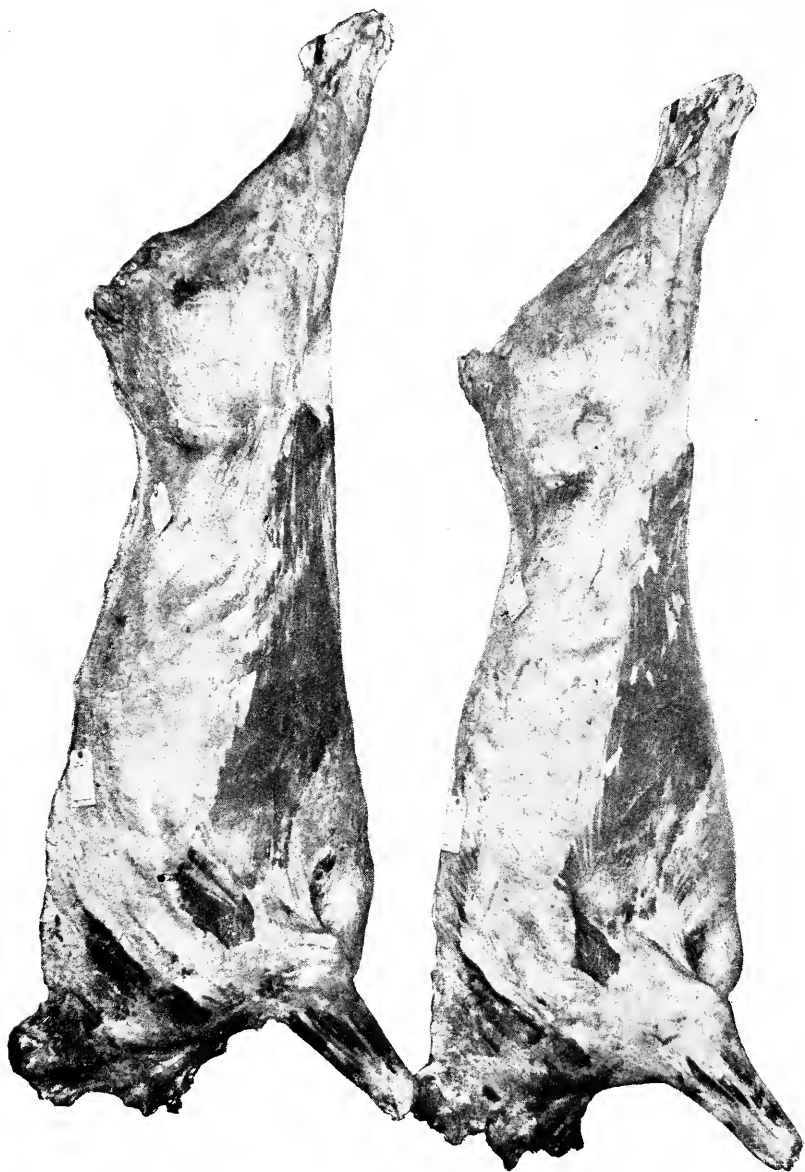


FIGURE 3.—Representative carcass produced from the good to choice lot of calves on the right and from the common lot of calves on the left. Note the fuller and smoother appearance of round, loin, rib, and chuck of the carcass on the right. (See, also, Figure 4 on page 10.)

*The Relative Value of High-Grade and Low-Grade Calves Marketed as Two-Year-Old Steers**

by E. A. LIVESAY

IN ORDER to gain additional information in regard to the relative values of well-bred beef calves as compared to calves of non-descript breeding, the state Agricultural Experiment Station started a feeding trial with such calves in the fall of 1922. Twenty-four steer calves were purchased in Harrison County in October, 1922. Twelve of these were high-grade calves of Hereford breeding, graded as good to choice, while twelve were low-grade calves of nondescript breeding, ten of which were graded as common and two as medium. The calves were started on the trial on November 17, 1922, and were marketed from grass on September 18, 1924; thus the calves were carried through two winter feeding periods and two summer grazing periods.

As the calves were to be carried over two winters and two summers it was thought advisable to divide each grade into two lots of six calves and make a test of the value of cottonseed meal as against linseed oilmeal in the ration for calves and yearlings.

Division, Stabling, and Feeding of Calves

The high-grade calves were of Hereford breeding. From all appearances they would have passed for purebred calves. They were fairly uniform in conformation and thick enough to be graded as good to choice beef calves. (*See Figure 1.*) The low grade calves were less uniform in conformation and with the exception of two calves they lacked thickness, were leggy, off color, and graded as common. Two calves were thicker and appeared to be fairly well-bred; one would have passed for a Shorthorn, while the other would have been considered a cross between the Aberdeen-Angus and Hereford breeds. The ten common calves appeared to represent about all the beef and dairy breeds in color and conformation. These calves were approximately the same age as the high-grade calves. (*See Figure 2.*)

*Submitted for publication September, 1927.



FIGURE 1.—The twelve high-grade calves which were graded as good to choice at the start of the experiment

In order to test the value of linseed oilmeal and cottonseed meal in rations for calves and yearlings the good to choice and the common calves were divided into two lots of six each. One lot of good to choice and one lot of common calves received linseed oilmeal in their rations while the other lots (one good to choice and one common) received a similar amount of cottonseed meal. Rations were composed of the same feeds and proportions for all lots except for the linseed oilmeal and cottonseed meal and were fed at the same rate per 1,000 pounds live weight. The lots of calves receiving linseed oilmeal and cottonseed meal also received these feeds in their rations as yearling steers. During the winters of 1922-23 and 1923-24 the calves and yearlings were fed twice daily. All lots were kept in pens in the barn at night and turned out in small lots during the day. Salt was kept in small boxes in all pens continuously, and all calves had equal access to water in the lots during the day. All feeds were fed in racks and troughs in the barn.

Feeds and Character of Pasture

The corn silage was made from Boone County white corn (ears included) in a good mature silage stage when ensiled. The mixed hay was composed of clover and timothy grown on the animal husbandry farm of the Experiment Station. All other feeds were bought.

The feeds were all of good quality during the winter feeding period of 1922-23. All were of good quality in 1923-24 with the exception of the mixed hay. The hay was damaged in the field by heavy rains in the summer of 1923, but the yearling steers seemed to relish it.

Table 1 gives the chemical analyses of the feeds fed as well as the analyses of similar feeds given by Henry and Morrison.* The

**Feeds and Feeding*, 18th ed. (1922).

TABLE 1.—Analyses of Feeds Fed Compared to Analyses of Similar Feeds Given by Henry and Morrison

Feed	1922-23					
	Water	Ash	Crude Protein	Carbohydrates		Fat
				Fiber	N-free Extract	
Corn silage	76.53	1.57	2.24	5.54	13.53	0.59
Mixed hay	5.64	4.03	6.45	32.25	49.23	2.40
Cottonseed meal	6.67	6.00	32.84	9.69	37.05	7.75
Linseed oilmeal	7.06	5.18	31.47	14.18	35.50	6.61
Shelled corn	9.90	1.14	8.69	2.17	73.94	4.16
Feed	1923-24					
	Water	Ash	Crude Protein	Fiber	N-free Extract	Fat
	69.18	1.21	1.99	6.98	19.74	0.90
	5.26	4.02	7.00	34.86	46.62	2.24
	7.07	6.18	36.73	12.67	31.30	6.05
	8.01	5.58	31.87	8.00	40.25	6.29

Henry and Morrison (Feeds and Feeding)

Feed	Water	Ash	Crude Protein	Carbohydrates		Fat
				Fiber	N-free Extract	
Corn silage, well matured	73.7	1.7	2.1	6.3	15.4	0.8
Mixed hay, grade No. 1 (clover and timothy)	12.2	6.1	8.6	29.9	40.8	2.4
Cottonseed meal, good	7.9	6.4	37.6	11.5	28.4	8.2
Linseed oilmeal (old process)	9.1	5.4	33.9	8.4	35.7	7.5
Shelled corn, dent	12.0	1.5	3.9	2.0	69.7	4.9

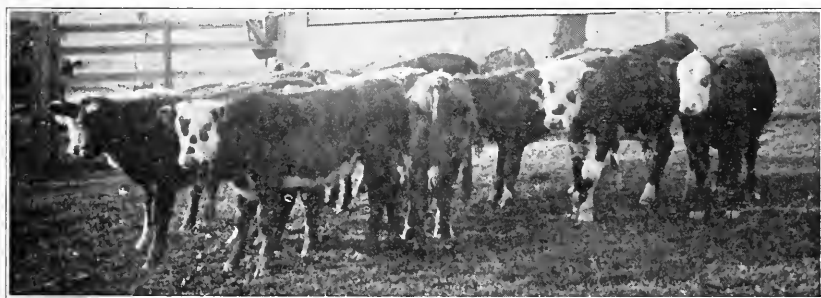


FIGURE 2.—The twelve calves of nondescript breeding, ten of which were graded as common and two as medium at the start of the experiment

mixed hay was low in ash and crude protein each year, compared to the average given by these authors.

Table 2 gives the digestible nutrients of the feeds fed during the two winters. The nutritive ratios of rations given in Tables 3 and 5 are based upon the digestible nutrients as given in Table 2.

TABLE 2.—Digestible Nutrients of Feeds Fed

Feed	Digestible Nutrients per One Hundred Pounds				
	1922-23				
	Dry Matter Pounds	Crude Protein Pounds	Carbo- hydrate Pounds	Fat Pounds	Total Pounds
Corn silage	23.47	1.14	13.21	0.48	15.43
Mixed hay	94.36	3.03	45.98	1.08	51.44
Cottonseed meal	93.33	27.59	31.37	7.36	75.52
Linseed oilmeal	94.94	28.01	35.77	5.83	77.01
Shelled corn	90.10	6.43	70.74	3.87	85.87
Feed	1923-24				
	Dry Matter Pounds	Crude Protein Pounds	Carbo- hydrate Pounds	Fat Pounds	Total Pounds
	Dry Matter Pounds	Crude Protein Pounds	Carbo- hydrate Pounds	Fat Pounds	Total Pounds
Corn silage	30.82	0.97	18.55	0.74	21.18
Mixed hay	94.74	3.36	46.33	1.12	52.21
Cottonseed meal	92.93	30.85	28.16	5.75	71.95
Linseed oilmeal	91.99	28.36	35.95	5.60	76.91

The same pasture was used for each year. It was considered a poor pasture for fattening. Very few acres of the area were classed as a fair sod. The majority of the acreage contained small brush and an inferior sod. The grasses, where the sod was considered fair, consisted of bluegrass and white clover. The grasses of the remainder of the pasture consisted mainly of "poverty grass" (*Danthonia spicata*) and various weeds.

Table 3 includes the data of the first winter feeding period. All lots were fed the same amounts of feeds in their rations per 1,000 pounds live weight. Rations for Lots I (good to choice) and II (common) contained cottonseed meal, while those for Lots III (good to choice) and IV (common) contained the same amount of linseed oilmeal. The variations in the rations are due to two causes: viz., variation in the lot weights, and the amounts of roughages which were weighed back from time to time. The amount of the feed (mixtures) per lot was increased each twenty-eight days according to the gains of the respective lots. The calves were fed during the first eighty-

seven days on a ration composed of the following feeds and amounts per 1,000 pounds live weight: corn silage, 40 pounds; mixed hay, 10 pounds; cottonseed meal, 4 pounds (Lots I and II); linseed oilmeal, 4 pounds (Lots III and IV); cracked corn, 3 pounds.

The calves of Lots I and II failed to clean up the roughage of this ration during the first half of February. At the close of the 87-day period, February 13, the ration was reduced to the following amounts per 1,000 pounds live weight: corn silage, 38 pounds; mixed hay, 4 pounds; cottonseed meal, 4 pounds (Lots I and II); linseed oilmeal, 4 pounds (Lots III and IV); cracked corn, 1 pound. This rate of feeding was continued until the end of the period, or sixty-seven days.

TABLE 3.—Results of Winter Feeding in 1922-23 (November 17 to April 20 inclusive—154 days)

Items	Grade of Steers			
	Lot I	Lot II	Lot III	Lot IV
	Good to Choice	Common	Good to Choice	Common
Number of steers per lot	6	6	6	6
Average initial weight (pounds)	447	313	457	321
Average final weight (pounds)	611	479	636	497
Average gain (pounds)	164	166	179	176
AVERAGE RATION PER STEER (pounds)				
Corn silage	18.43	14.42	19.86	14.52
Mixed hay	2.78	2.45	3.00	2.49
Cracked corn	0.85	0.64	0.90	0.65
Cottonseed meal	2.01	1.53	....	....
Linseed oilmeal	....	....	2.13	1.55
Nutritive ratio	1:6.22	1:6.25	1:6.31	1:6.27
TOTAL FEED CONSUMED (pounds)				
Corn silage	17,032	13,324	18,355	13,414
Mixed hay	2,564	2,267	2,802	2,297
Cracked corn	787	595	836	604
Cottonseed meal	1,861	1,411	....	....
Linseed oilmeal	....	....	1,966	1,429
COST OF FEEDS				
Corn silage @ \$6 per ton	\$51.09	\$39.98	\$55.06	\$40.24
Mixed hay @ \$18 per ton	23.07	20.41	25.21	20.67
Cracked corn @ 84c per bushel	11.80	8.92	12.54	9.05
Cottonseed meal @ \$50 per ton	46.52	35.26	....	....
Linseed oilmeal @ \$50 per ton	....	....	49.14	35.72
Total cost of wintering	\$132.48	\$104.57	\$141.95	\$105.68
Cost of wintering per steer	22.08	17.43	23.66	17.61

Comparative Value of Linseed and Cottonseed Meal

The linseed oilmeal (Lots III and IV) gave slightly more gain for the 154 days and the calves in these lots seemed to have a more uniform appetite than those of Lots I and II, which received cottonseed meal.

Table 4 gives the gains on each lot for the first grazing season of 236 days.

TABLE 4.—Summer Gains in 1923 (April 21 to December 12 inclusive—236 days)

Items	Average Weight per Steer			
	Lot I Pounds	Lot II Pounds	Lot III Pounds	Lot IV Pounds
Average initial weight	611	479	636	497
Average final weight	769	663	747	678
Average gain	158	184	111	181

Table 5 gives the data for the second wintering period. The yearlings were fed and handled much the same as in the previous winter when they were calves. The rations for the entire period of the second year remained constant and were composed of the following feeds and amounts per 1,000 pounds live weight: corn silage, 35 pounds; mixed hay, 4 pounds; cottonseed meal, 1½ pounds (Lots I and II); linseed oilmeal, 1½ pounds (Lots III and IV).

The amount of feed each lot received was increased each twenty-eight days according to gains made. The cottonseed meal and linseed oilmeal lots did not reflect the difference in appetite as evidenced in the previous winter. Gains were slightly in favor of cottonseed meal. The cottonseed meal was more than 3 percent higher in digestible crude protein than the previous year,—a partial explanation of the greater gain for the cottonseed lots.

Table 6 gives the gains for the second grazing season. All lots were shipped to market following the final weigh period on September 18, and were sold on the Pittsburgh market on September 22, 1924.

Table 7 is a summation of the summer and winter gains for the two winter feeding periods and the two grazing periods. This table shows that the good to choice calves made slightly more winter gains for the two years, while the common calves made greater summer gains and also greater gains for the combined winter and summer

TABLE 5.—Results of Winter Feeding in 1923-24 (December 13 to May 1 inclusive—140 days)

Items	Grade of Steers			
	Lot I Good to Choice	Lot II Com- mon	Lot III Good to Choice	Lot IV Com- mon
Number of steers per lot	6	6	6	6
Average initial weight (pounds)	769	662	747	678
Average final weight (pounds)	898	771	862	878
Average gain (pounds)	129	108	115	100
AVERAGE RATION PER STEER (pounds)				
Corn silage	28.45	24.51	27.79	24.69
Mixed hay	3.25	2.81	3.16	2.82
Cottonseed meal	1.21	1.04	....	....
Linseed oilmeal	....	....	1.19	1.05
Nutritive ratio	1:10.33	1:10.34	1:10.69	1:10.71
TOTAL FEED CONSUMED (pounds)				
Corn silage	23,905	20,591	23,343	20,749
Mixed hay	2,736	2,359	2,656	2,374
Cottonseed meal	1,018	880	....	....
Linseed oilmeal	....	....	1,002	888
COST OF FEEDS (value of feeds the same as in Table 3)				
Corn silage	\$71.71	\$61.77	\$70.03	\$62.24
Mixed hay	24.62	21.23	23.90	21.36
Cottonseed meal	25.46	22.00	....	....
Linseed oilmeal	....	....	25.05	22.12
Total cost of wintering	\$121.79	\$105.00	\$118.98	\$105.72
Cost of wintering per steer	20.30	17.50	19.83	17.62

periods for the two years, or the duration of the experiment.

Table 8 includes the combined data on the two lots of good to choice and the two lots of common calves. It covers the costs of the winter feeds and pasture for two years and gives the actual sale values on the Pittsburgh market as well as the relative value of the

TABLE 6.—Summer Gains in 1924 (May 1 to September 18 inclusive—140 days)

Items	Average Weight per Steer			
	Lot I Pounds	Lot II Pounds	Lot III Pounds	Lot IV Pounds
Average initial weight	898	771	862	778
Average final weight	1113	1028	1115	1072
Average gain	215	257	253	294



FIGURE 4.—A different view of the same side of carcasses as shown in Figure 3 (page 2). This view brings out the striking difference in the thickness of the carcasses

calves at the beginning of the experiment. It should be kept in mind that these cattle were marketed on one of the lowest markets (Pittsburgh) since the war,—a market crowded with cattle of the quality and finish of the twelve steers classed as good to choice when entering the experiment as calves. The salesman for the commission company handling these cattle was positive that he could have sold the higher-grade cattle for \$1.00 per 100 pounds more money had they been on the market a week earlier. He also was equally positive that the lower-grade cattle could not have been sold for a higher figure on the earlier market, as it was the small numbers of low-grade cattle on the market that allowed them to sell as close to the better grade as they did. The market conditions which existed when these cattle were sold give a decided advantage to the common calves. Table 8 gives the relative value of good to choice as against common calves.

Carcasses

The data in Table 8 show that the steers developed from the good to choice calves dressed approximately 3 percent more than steers developed from the common calves. This table also shows that the hides of the higher-grade steers weighed approximately ten pounds more each than the hides of the lower grade. The carcasses from the higher grade of steers were thicker from every standpoint, and the fat was of a more desirable color. A side of a representative carcass from each lot is

shown in Figures 3 and 4 with footnotes pointing out the differences.

TABLE 7.—Summary of Winter and Summer Gains of Good to Choice and Common Steers

Items	Grade of Steers			
	Lot I Good to Choice Pounds	Lot II Common Pounds	Lot III Good to Choice Pounds	Lot IV Common Pounds
Average winter gain 1922-23	164	166	179	176
Average winter gain 1923-24	129	108	115	100
Average total winter gain	293	274	294	276
Average summer gain 1923	158	184	111	181
Average summer gain 1924	215	257	253	294
Average total summer gain	373	441	364	475
Average total gain winter and summer	666	715	658	751

TABLE 8.—Summary Showing Relative Value of Good to Choice as Against Common Calves

Items	Good to Choice Calves	Common Calves
Number of steers	12	12
Average home weight (pounds)	1,114	1,050
Average Pittsburgh weight or market weight (pounds)	1,068	1,008
Average drift (pounds)	45	42
Average dressed weight (warm) (pounds)	602	542
Average dressed percent (warm weight)	56.4	53.8
Average hide weight (pounds)	\$1.4	71.7
Cost of feeds and pasture:		
Total cost of winter feeds per steer	\$42.84	\$35.08
Total cost of pasture per steer	17.00	17.00
Total cost of feed and pasture per steer	\$59.84	\$52.08
Selling price on market (per 100 pounds)	\$8.00	6.55*
Sale value per steer	\$5.44	66.08
Difference between sale value and cost of production, or relative value of calves at start of experiment	25.50	14.00

*Average selling price. Ten steers sold for \$6.75 and two steers sold for \$5.50 per 100 pounds.

SUMMARY

There was practically no difference between the winter gains made by the good to choice and the common calves during the first winter (1922-23). Greater gain was made by calves of both lots (III and IV) which received linseed oilmeal as compared to Lots I and II, which received cottonseed meal. The common calves, regardless of the difference in their winter rations, made larger summer gains than did the good to choice calves for the first grazing season (1923). This greater summer gain can be explained on the basis of the condition of the calves. The common calves entered the winter feeding period in a thinner condition and made about the same winter gains as did the good to choice lots. They were judged to be thinner in condition when the grazing period began and a greater gain on grass was expected.

The good to choice calves made slightly larger gains the second winter (1923-24) as yearling steers than did the common calves. A slight advantage also was noted in favor of the cottonseed meal lots during the second winter. The gains on grass the second summer were the reverse of winter gains in all lots. The lot making the greater winter gain made the smallest gain on grass. This corresponds with gains made during the winter and the following grazing season at this station, when the steers are one year older.

The market at the time these steers were sold gave a relative value of \$25.50 for the good to choice calves and \$14.00 for the common calves. As mentioned in connection with the data in Table 8, the condition of the market was in favor of the lower grade of steers. Thus the common calves had a value of only three-fifths the value of the good to choice calves.

The good to choice calves developed into steers with a higher dressing percentage. The carcasses were smoother and thicker and carried a more desirable coloring of fat.

